

# Motorola<sup>®</sup> HOME Radio

## SERVICE MANUAL

MODELS  
**5X21U**  
**5X22U**  
**5X23U**  
 CHASSIS  
**HS-259**

### GENERAL INFORMATION

TYPE - A combination standard broadcast and shortwave table model receiver.

#### RECEIVER MODELS

Model	Color
5X21U	Walnut-Mahogany
5X22U	Ivory
5X23U	Ebony

#### TUBE COMPLEMENT -

12BE6 - Converter  
 12BA6 - IF Amplifier  
 12AT6 - Detector, AVC & 1st Audio Amp  
 50C5 - Power Amplifier  
 35W4 - Rectifier

POWER SUPPLY - 117V AC/DC 35 watts



TUNING RANGE - Standard Broadcast - 535 to 1620 Kc  
 Shortwave - 5.85 Mc to 18.1 Mc

IF - 455 Kc

### INSTALLATION & OPERATING INSTRUCTIONS

#### ANTENNAS

For shortwave reception, it is necessary to connect a length of wire (at least 10 feet long) to the screw terminal located on the radio rear panel. A commercial shortwave antenna is recommended for best results.

No outside antenna is normally required for standard broadcast station reception. A loop antenna for receiving broadcast stations is built into the radio. If the radio is located at a considerable distance from broadcast stations, it may be necessary to secure additional signal pick-up by using an external antenna. The shortwave antenna wire may be used for additional pick-up of standard broadcast stations; leave the wire connected to the shortwave terminal screw and wind two turns of the wire in the slots located at the top of the radio rear panel.

CAUTION: Do not connect antenna or chassis to water pipe, radiator or other ground.

#### CONTROLS

POWER SWITCH & VOLUME CONTROL. The power switch and volume control are combined and operated with the left-hand knob. If the radio does not operate from a DC power line after being turned on for a few minutes, reverse the power cord plug in the power outlet. When operating from AC power lines, reception can sometimes be improved by reversing the power cord in the power outlet.

BANDSWITCH. The small (inner) right-hand knob selects standard broadcast or shortwave reception, as desired. Rotate this knob to the left for standard broadcast or to the right for shortwave reception.

TUNING. The large (outer) right-hand knob is used for tuning both standard broadcast and shortwave stations.

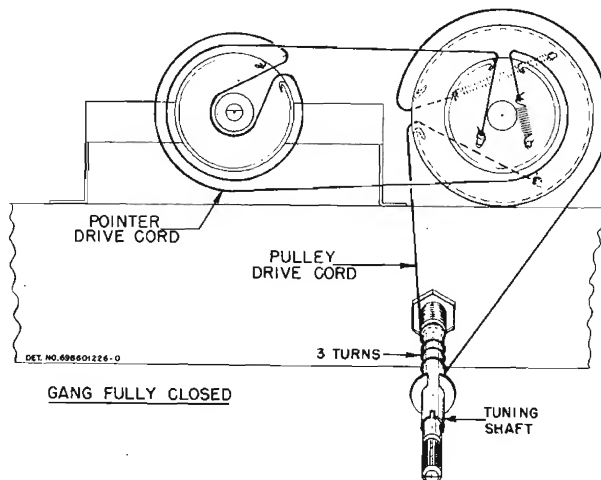


FIGURE 1. STRING DRIVE DETAIL

4545 AUGUSTA BOULEVARD

*Motorola Inc.*

CHICAGO 51, ILLINOIS

## SERVICE NOTES

### TO REMOVE CHASSIS FROM CABINET:

1. Remove the control knobs, pointer knob and pointer; these parts pull off.
2. Remove the two split plugs which hold the top of the

loop panel to the cabinet.

3. Remove the two chassis mounting screws, accessible through the slots in the loop panel and slide the chassis from the cabinet.

## ALIGNMENT

NOTE: It is recommended that an isolation transformer be placed between the power line and the receiver to avoid hum and electrical shocks. If an isolation transformer is not available, connect the low side of the signal generator to E- through a .1 mf capacitor.

1. Connect a low range output meter across the speaker voice coil.
2. Connect the low side of the signal generator to B-.
3. Set the signal generator for 400 cycle, 30% modulation.

4. Turn the receiver volume control to maximum.
5. Use a small fibre screwdriver for aligning the IF and diode transformers.
6. As stages are brought into alignment, reduce the signal generator output to a level which produces less than .40 volts (.05 watt) across the voice coil to avoid overloading the receiver.
7. See Figure 2 for adjustment locations and the following chart for procedure.

### ALIGNMENT CHART

STEP	DUMMY ANTENNA	GENERATOR CONNECTION	GENERATOR FREQUENCY	BAND SWITCH	GANG SET TO	ADJUST	REMARKS
<b>IF ALIGNMENT</b>							
1.	.1 mf	Rear stator of tuning capacitor	455 Kc	-	Gang opened	1, 2, 3 & 4	Adjust for maximum.
<b>SW BAND RF ALIGNMENT</b>							
2.	400 ohms	SW Ant terminal	18.1 mc	SW	Fully opened	5 & 6	Adjust for maximum.
<b>BC BAND RF ALIGNMENT</b>							
3.	.1 mf	Rear stator of tuning capacitor	1620 Kc	BC	Fully opened	7	Adjust for maximum.
4.	None	Radiation loop*	1400 Kc	BC	Tune for maximum	8	Adjust for maximum.

\* Connect generator output to 5" diameter, 3 turn loop and couple to receiver loop. Keep loops at least 12" apart.

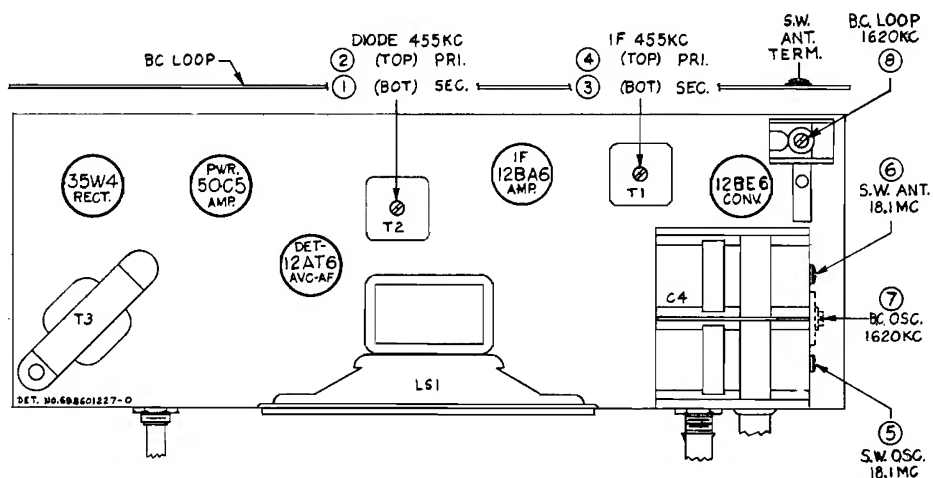


FIGURE 2. TUBE & TRIMMER LOCATIONS



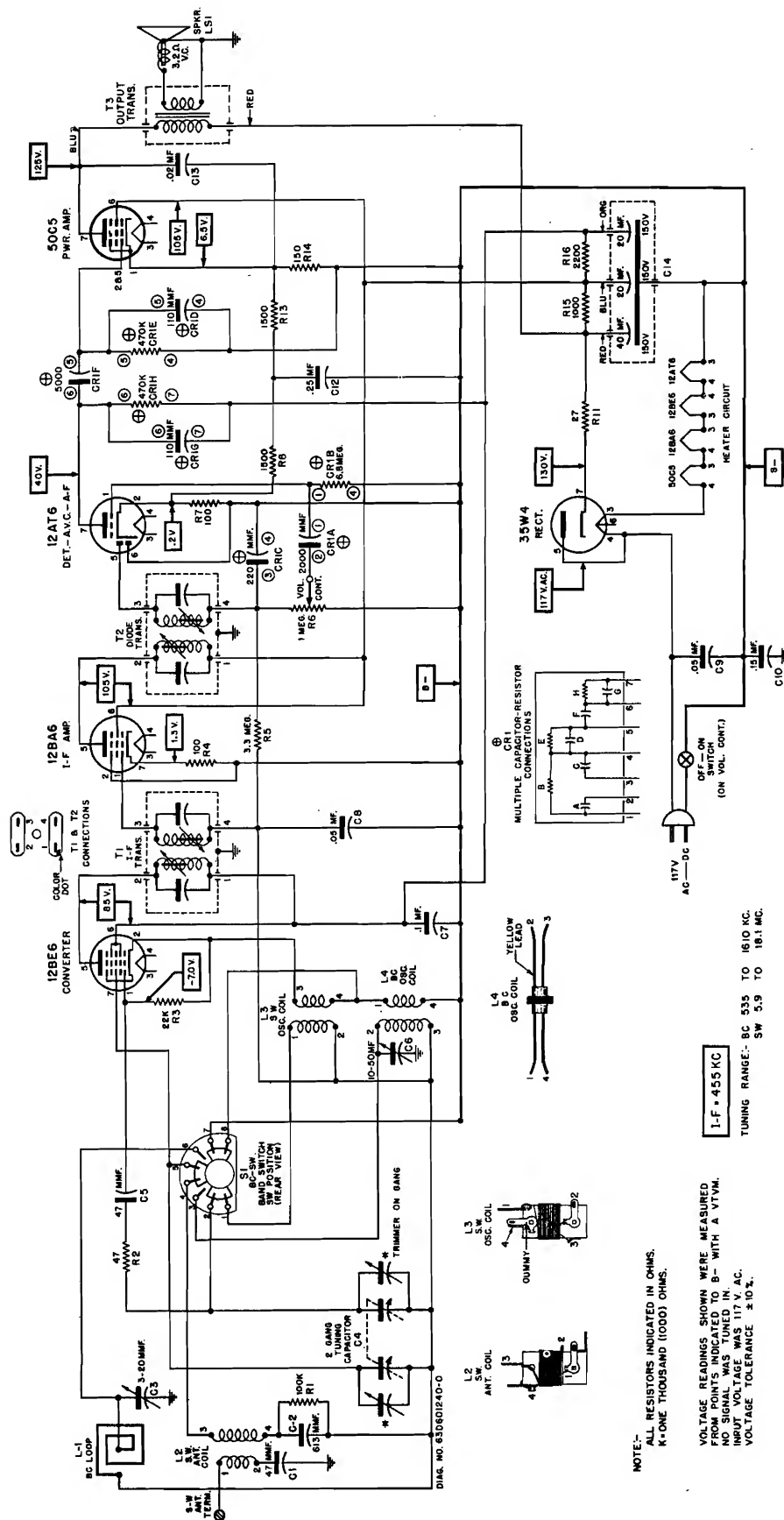


FIGURE 4. SCHEMATIC DIAGRAM OF CHASSIS USING MULTIPLE CERAMIC CAPACITOR-RESISTOR

# REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part No.	Description	List Price	Part Number	Description	List Price
CHASSIS PARTS - ELECTRICAL				CHASSIS PARTS - MECHANICAL		
<u>Capacitors</u>				7K485971	Bracket, loop mtg .....	.05
C-1	21K77373	Ceramic: 47 mmf 500V .....	.20	1X600589	Bracket and Bushing Assembly, pointer shaft .....	.30
C-2	21K891154	Mica: 613 mmf 3% 500V .....	.75	42A485548	Clip, coil can mtg (for T-1 & T-2)....doz	.20
C-3	20A600917	Mica, variable: 3 to 20 mmf; in- cludes bracket .....	.35	11M8944	Cord, dial: 18# black .....	.10
C-4	19B600922	Variable, 2 gang: includes pulley..	2.45	30A470651	Cord, line and plug; 6 ft long .....	.75
C-5	21K77373	Ceramic: 47 mmf 500V .....	.20	5A19658	Eyelet, spacer (gang mtg) .....	.20
C-6	20A680362	Mica, variable: 10 to 50 mmf .....	.25	5A70404	Grommet, rubber (gang mtg).....doz	.60
C-7	8R9807	Paper: .1 mf 400V .....	.25	14A482844	Insulator, cord outlet .....	.25
C-8	8R9821	Paper: .05 mf 200V .....	.20	29R3010	Lug, soldering .....	.30
C-9	8R9816	Paper: .05 mf 400V .....	.20	2S7051	Nut, hex: Palnut; 3/8-32 x 9/16; stl; cad pl (volume control and bandswitch mtg) .....	.15
C-10	8R9843	Paper: .15 mf 200V .....	.20	1X600590	Pulley and Bushing Assembly, pointer drive	.25
C-11	21B482847	Ceramic, multiple: .002 mf, 220 mmf, 220 mmf & .005 mf 400V .....	.65	5S7771	Rivet: .088 x 3/16; stl; nkl pl (tube socket mtg) .....	.50
C-12	8A470504	Paper: .25 mf 50V .....	.25	5S7706	Rivet: .122 x 1/8; stl; nkl pl (variable capacitor mtg) .....	.50
C-13	8R9802	Paper: .02 mf 400V .....	.20	5S7707	Rivet: .122 x 5/32; stl; nkl pl (spring tube shield, output transformer and variable capacitor & bracket assem- bly mtg) .....	.50
C-14	23K600927	Electrolytic: 40-20-20 mf/150V.....	1.10	3S2294	Screw, machine: 6-32 x 1/2 plain hex head; locking type; stl; cad pl (gang mtg)....doz	.15
<u>Capacitor-Resistor</u>				3S7477	Screw, machine: 8-32 x 1/4 plain hex head; stl; cad pl (loop back mtg).....doz	.15
CR-1	21B601007	Capacitor-Resistor: 2000 mmf, 220 mmf, 5000 mmf, 110 mmf, 110 mmf, 6.8 meg, 470,000 ohms & 470,000 ohms .....	.85	3S2695	Screw, sheet metal: #6 x 3/16 PKZ plain hex head; stl; cad pl (coils and pointer bracket mtg) .....	.50
<u>Coils</u>				3S7454	Screw, sheet metal: #8 x 1/4 PKZ plain hex head; stl; cad pl (speaker mtg)per/c	.50
L-1	24K600687	Loop Antenna Assembly: includes back panel .....	1.05	3S3398	Screw, sheet metal: #6 x 3/8 PKZ plain hex head; stl; cad pl (loop bracket & insulator mtg) .....	.50
L-2	24B600925	Coil, shortwave antenna .....	.70	3S7148	Setscrew: 6-32 x 1/8; Allen head; stl; cad pl (pointer pulley assembly re- tainer) .....	.10
L-3	24B600924	Coil, shortwave oscillator.....	.70	47K600506	Shaft, pointer: brass .....	.10
L-4	24A600926	Coil, BC oscillator .....	.75	47K600928	Shaft, tuning .....	.20
<u>Speaker</u>				26A481521	Shield, spring (for 12AT6 tube).....doz	.50
IS-1	50C691401	Speaker, PM: 4"; 3.2 ohm VC.....	2.50	9A472534	Socket, tube: 7-prong .....	.15
		exch	1.90	9K580218	Socket, tube: 8-prong .....	.15
<u>Resistors</u>				41A73996	Spring, tension (electrolytic mtg).....	.05
Note: All resistors are insulated carbon type unless otherwise specified.				41A14111	Spring, tension (dial cord -long)....doz	.40
R-1	6R6075	100,000 20% 1/2W .....	1.00	41A21332	Spring, tension (dial cord -short)....doz	.50
R-2	6R2108	47 20% 1/2W .....	1.00	4K692188	Washer, "C" (pointer shaft retainer)..doz	.20
R-3	6R6028	22,000 20% 1/2W .....	1.00	4A73639	Washer, "C" (tuning shaft retainer)....doz	.20
R-4	6R6018	100 20% 1/2W.....	1.00	4S7633	Washer, flat: 9/16 x 11/64 x .033 thick; stl; cad pl (loop back mtg).....doz	.15
R-5	6R2118	3.3 meg 20% 1/2W .....	1.00	4K482859	Washer, insulated shoulder (loop bracket & insulator mtg) .....	.15
R-6	18K600474	Volume control: 1 meg; includes on-off switch .....	1.00	CABINET PARTS		
R-7	6R6326	100 10% 1/2W .....	1.00	13C600935	Bezel, dial (5X21U) .....	1.50
R-8	6R6038	1500 10% 1/2W .....	1.00	13K600936	Bezel, dial (5X22U) .....	1.50
R-9	6R2109	10 meg 20% 1/2W .....	1.00	13K600937	Bezel, dial (5X23U) .....	1.50
R-10	6R6032	470,000 20% 1/2W .....	1.00	16E600187	Cabinet, table model: molded; walnut- mahogany finish (5X21U) .....	3.90
R-11	6R5683	27 10% 1/2W .....	1.00	16K600191	Cabinet, table model: molded; ivory fin- ish (5X22U) .....	4.95
R-12	6R6032	470,000 20% 1/2W .....	1.00	16K600189	Cabinet, table model: molded; ebony fin- ish (5X23U) .....	3.90
R-13	6R6038	1500 10% 1/2W .....	1.00	13B600573	Grille, cabinet (5X21U and 5X22U) .....	.90
R-14	6R3992	150 20% 1/2W .....	1.00	13K600575	Grille, cabinet (5X23U) .....	.90
R-15	6R3953	1000 20% 1W .....	.15	36K482767	Knob, band control (5X21U) .....	.15
		doz	1.45	36K482788	Knob, band control (5X22U) .....	.25
R-16	6R6290	2200 20% 1/2W .....	1.00	36K600939	Knob, band control (5X23U) .....	.25
<u>Switch</u>				36K600570	Knob, pointer retainer (5X21U) .....	.15
S-1	40K600919	Switch, band: 2-position .....	.90	36K600571	Knob, pointer retainer (5X22U) .....	.15
<u>Transformers</u>				36K600572	Knob, pointer retainer (5X23U) .....	.15
T-1,2	24B485553	IF and Diode: complete with tuning cores, padding capacitors and shield .....	.95			
T-3	25K485973	Output Transformer .....	.65			

<u>Part Number</u>	<u>Description</u>	<u>List Price</u>	<u>Part Number</u>	<u>Description</u>	<u>List Price</u>
36K690668	Knob, tuning control (5X21U) .....	.25	52A600451	Pointer, dial (5X21U and 5X22U) .....	.25
36K690669	Knob, tuning control (5X22U) .....	.30	52K600453	Pointer, dial (5X23U) .....	.25
36K600943	Knob, tuning control (5X23U) .....	.10	3S3371	Screw, machine: 8-32 x 3/8 PKF plain hex head; stl; cad pl.(chassis mtg to	
36B690664	Knob, volume and on-off control (5X21U)..	.55		cabinet) .....per/c	.50
36K690665	Knob, volume and on-off control (5X22U)..	.55	7C600814	Support, cabinet (5X21U and 5X22U).....	.90
36K600945	Knob, volume and on-off control (5X23U)..	.55	7K600816	Support, cabinet (5X23U) .....	.95
38A25507	Plug, split (loop back mtg to cabinet)doz	.15			

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